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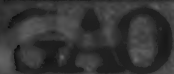
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ABSTRACT

This report presents information on the experience of universities under the Patent and Trademark Amendments of 1980 (Public Law 96-517), and summarizes findings from annual reporting requirements of the law. The objectives of the report were to find what the perceived impact of the law had been at universities active in patent activities, find how many inventions have been disclosed, and how the universities have marketed their inventions. The time period covered was January 1, 1982 to December 31, 1984. Information in the report is from 19 universities representing a broad mix, but is not necessarily representative and generalizable to all universities. Information was collected by interviewing patent management administrators at the universities, patent officials at two management firms, and representatives from a nonprofit organization representing about 400 patent administrators from various colleges and universities throughout the country. Appendix I contains detailed information on the objectives, scope, and methodology. Some findings include: (1) inventions are more commercial and university and private enterprise collaboration has increased; (2) patent applications by universities have increased; (3) few patents produce sizeable royalty income; (4) university patent policies have been revised, updated, or adopted; and (5) institutions have their own formula for royalties paid to inventors. (JM)

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United States General Accounting Office

Report to the Honorable Robert Dole
United States Senate

April 1996

PATENT POLICY

Universities' Research Efforts Under Public Law 96-517

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Resources, Community, and
Economic Development Division
B-207939

April 4, 1986

The Honorable Robert Dole
United States Senate

Dear Senator Dole:

This report responds to your June 4, 1985, request that we (1) obtain information on universities' experiences under the Patent and Trademark Amendments of 1980 (Public Law 96-517) and (2) compile a summary of our findings resulting from work conducted for our annual reporting requirements under this law. Public Law 96-517 establishes a uniform patent policy that allows small businesses and nonprofit organizations, including universities, the right to retain title to inventions resulting from federally sponsored research projects. The law also requires us to report, at least once a year, to the Senate and House Committees on the Judiciary on how federal agencies are implementing the law and other aspects of government patent policies and practices.

Our audit objectives were to obtain answers to the following questions:

- What has been the perceived impact of Public Law 96-517 at universities that are active in patent activities?
- How many inventions have been disclosed (i.e., discovered and reported to universities' patent administrators) since passage of Public Law 96-517?
- How have the universities marketed (i.e., licensed) their inventions?

We limited our work to obtaining information on 19 U.S. universities' patent activities during the 3-year period between January 1, 1982, and December 31, 1984. The 19 respondents represent a broad mix of universities. However, our sample of universities is not representative, and our results cannot be generalized to all U.S. universities.

To collect the information, we interviewed patent management administrators (hereafter referred to as university representatives) at the 19 universities, patent officials at two patent management firms, and representatives from a nonprofit organization which represents about 400 patent administrators from various colleges and universities throughout the country. Appendix I contains detailed information on our objectives, scope, and methodology.

Perceived Impact of Public Law 96-517

Representatives at 17 of the 19 universities said that it is too early to measure the effect Public Law 96-517 has had on their research and development (R&D) activities. However, they said that the law has caused some positive results regarding patents in the university community. According to the representatives, these results are as follows.

- Universities can enter into licensing agreements with private companies easier. Companies know initially who has title to the invention; therefore, universities have more control over disposing of inventions.
- Private companies and university representatives collaborate more. Companies are more willing to discuss inventions and give institutions funds to further develop them.
- Inventors are more interested in inventions and technology transfer taking place at the university level. Inventors are taking more pride in their research efforts.
- Federal agencies' regulations are more uniform; therefore, less paperwork is required. University representatives no longer have to apply for title to inventions at individual agencies. The law requires all federal contracts, grants, and cooperative agreements to include a patent clause that specifically spells out universities' rights to inventions.

Some university representatives told us that the law has caused no real changes in terms of ownership rights to inventions discovered while performing research funded by HHS's National Institutes of Health and NSF. According to the representatives, they had institutional patent agreements with these agencies before passage of Public Law 96-517, which allowed them to retain title to inventions. Specifically, the agreements stated that the universities would notify the agencies of inventions and request title, if so desired. The agencies would then waive their rights by giving title to the requesting universities.

Universities' Patent Activities

There is no clear trend in the nature and scope of universities' patent activities since passage of Public Law 96-517. University representatives told us that it was too early to assess the effect of the law definitively because it has been in effect less than 5 years. On an average, it can take 10 years or longer to get an invention from the point of discovery to the license and/or royalty collecting phases. This process takes so long because many inventions require substantial development before being considered marketable.

For example, researchers at the Michigan Technological University (MTU) in Houghton, Michigan, invented a moulded wood pallet under a federally funded research project. They gave us an illustrative schedule of the time lag between research and marketability as follows:

- 1977 - research project began
- 1979 - moulded wood pallet invention discovered and patent application filed
- 1983 - patent issued
- 1985 - patent in development phase

MTU has entered into a contract with the Navy to provide pallets for durability testing in transporting equipment and supplies. MTU plans to license the technology to a manufacturer if the durability tests are successful. Meanwhile, the potential manufacturer is currently performing economic and market analyses to determine if the pallets will be commercially viable. The MTU patent representative had no idea how long it will be before the invention will actually reach the manufacturing phase or when royalties will be collected. However, he believes that the wood pallet technology is advantageous over common wooden pallets because moulded pallets can be shaped to fit specialty shipments, including weapons and defense vehicles.

Invention Disclosures

According to university representatives, they did not routinely maintain records of inventions disclosed under federally funded research before passage of Public Law 96-517. However, representatives of all 19 universities gave us data on inventions disclosed while performing federally financed research between 1982-84. The total number of disclosures reported by all the universities fluctuated during the period.

Table 1: Summary of Invention Disclosures

(1982-84)	
Year	Number of disclosures reported
1982	636
1983	678
1984	606
Total	1,920

Of the 1,920 disclosures shown in table 1, three universities reported about 70 percent of the disclosures. They were the California Institute

of Technology (34 percent), University of California system (23 percent), and Stanford University (13 percent). The remaining universities reported less than 4 percent each of the total. Most of the disclosed inventions were in the biological, medical, and electronics fields.

Representatives at the universities told us that many of the inventions disclosed in 1982-84 may have resulted from research that began before the passage of Public Law 96-517. Some representatives further commented that all disclosed inventions do not always result in patents or prove to be commercially viable. In fact, many disclosed inventions are never patented or licensed because the same or similar inventions have already been patented, they need further development before being patentable, private companies are not interested in particular inventions, or inventions can be protected by less expensive methods such as copyrighting.

Licensing Activities

We found that universities generally market inventions through licensing arrangements with private companies since the universities themselves do not have manufacturing capability. Representatives from 18 of the universities said that they often delay filing for patents when inventions are disclosed to search for licensees. If a university is interested in issuing a license promptly, a license may be granted before the university applies for a patent. Universities use this approach to avoid spending staff time and money applying for a patent to find later that there is no market for the invention. Other representatives added that they seek licensees soon after inventions are disclosed because the patent-award process takes too long—about 2 to 3 years. When the patent is finally issued, the invention or technology may be out dated or a company or licensee may not want to wait that long before being able to further develop an invention.

Eighteen of the 19 representatives told us that, as a practice, they file patent applications on nearly all licensed inventions. However, some inventions are licensed without ever filing for a patent. This is primarily done for inventions involving biological materials, certain computer hardware equipment and devices, and software items. The representatives said that the prime reason an application is not filed is because the patent can easily be infringed or the technology changed rapidly. In the case of biological materials, filing a patent application which would contain sufficient data on the invention is a very complicated task.

The representatives also told us that they sometimes license "know how." For example, a researcher may develop a process for separating different types of microscopic organisms for research purposes. Because the process is not patentable, the university may license the know how for separating the organisms.

We found that university representatives rely on both inside and outside sources, primarily patent management firms, to market (find a licensee) their inventions. At 10 of the 19 universities, representatives said that they market their inventions both directly (by relying on in-house staff) and indirectly (by relying on patent management firms). The determination of which method to use is made on a case-by-case basis. For example, if the in-house staff cannot find a licensee, they may go to patent management firms for help. On the other hand, if a patent management firm elects not to market an invention and the university representatives believe that the invention should be marketed, it will be marketed by in-house staff.

At the remaining nine universities, representatives said they rely solely on their in-house staffs to market inventions. These universities prefer this approach because they believe that they have more control of the invention and more expertise to do the necessary marketing. Some officials said that the patent management firms are very selective when it comes to marketing inventions and choose ones that they believe are easiest to license. Other representatives added that the use of these firms reduces the amount of royalties a university receives from an invention. These firms may get as much as 40 percent of the royalties collected.

The Research Corporation and University Patent, Inc., are the two patent management firms most often used by the 10 universities who sometimes market their inventions indirectly. These firms have agreements with the universities to perform various services related to obtaining patents or transferring technologies. These services include finding potential licensees, negotiating royalties, and collecting royalty fees. These services are provided at no direct cost to the universities. However, royalties are shared on a percentage basis by the firm, university, and inventor. Also, upon entering into agreements with patent firms, universities often transfer invention ownership to these companies, thereby giving them all rights to file for a patent.

Observations From Past GAO Studies

To date, we have issued three reports under our Public Law 96-517 reporting requirements. These reports and a summary of our conclusions or findings in each report are as follows.

Report #1:

Patents and Trademark Amendments of 1980 Set the Stage for Uniform Patent Practice By Federal Agencies, PAD-82-32, dated May 20, 1982.

In this report, we concluded that before passage of Public Law 96-517, agencies' practices of assigning title to inventions made under federally supported research differed substantially. The law, however, provides a basis for achieving the desired uniformity of practice among agencies.

Report #2:

Major Federal Research and Development Agencies Are Implementing the Patent and Trademark Amendments of 1980, RCED-84-26, dated February 28, 1984.

In this report, we concluded that the five major R&D agencies have incorporated provisions of the law into their procurement regulations. We also concluded that these agencies had established policies and practices for allowing small businesses and nonprofit organizations, including universities, to retain title (ownership) to inventions.

Report #3:

Federal Agencies' Policies and Practices Are in Accordance With Patent and Trademark Amendments of 1980, RCED 85-94, dated August 29, 1985.

In this report, we discussed activities of 10 R&D agencies'¹ titling and licensing activities between June 1, 1983, and March 1, 1985. We found that as required by law and President Reagan's presidential memorandum dated February 18, 1983, the 10 agencies were allowing contractors and grantees, regardless of size, to retain title to inventions discovered under federally financed research. Regarding agencies' licensing of inventions, we found that the level of licensing activities varied among the 10 agencies.

¹The Departments of Defense, Energy, Agriculture, Transportation, Health and Human Services, Interior, and Commerce; the National Aeronautics and Space Administration; the National Science Foundation; and the Environmental Protection Agency.

As stated in our report, we could not compare whether there had been changes in the number of inventions reported to federal agencies or the number of licenses granted by the agencies before and after passage of the law because, according to agency officials, they did not maintain titling and licensing statistics before the law passed.

As shown in table 2, which presents data from our report, the number of inventions reported to the 10 agencies fluctuated whereas the number of licenses granted by them increased over the 3 fiscal years (1982-84).

Table 2: Summary of Inventions Reported to and Licenses Granted by Federal Agencies (FY 1982-84)

Fiscal year	Number of inventions reported	Number of licenses granted
1982	5,463	131
1983	5,913	138
1984	5,629	142

Agency officials told us that they did not know what effect, if any, Public Law 96-517 had on the figures they gave us. Most officials believe that it was too early for the law to have any measurable effect. They believed that the number of inventions reported and licenses granted were influenced by other factors, including the nature of the research performed by the agency.

Observations From Studies Performed by Other Groups

Appendix II of this report contains summaries of observations made by other groups on universities' experiences under Public Law 96-517.

Summary

It is too early to determine the impact of Public Law 96-517 because it has been in effect less than 5 years. According to representatives at the universities and documentation given to us, it can take as long as 10 years to get an invention from the disclosure to the marketability phase. Because it takes so long to market an invention, the true impact of the law cannot be measured for years to come.

Representatives at all 19 institutions reported that Public Law 96-517 generally has had a positive effect on their research activities. For example, the representatives told us that researchers on universities' faculties have become more aware of the potential of their research

efforts. Also, universities have more control of their inventions now that they own them. According to the representatives, invention ownership has given universities a greater capability to transfer new technologies when collaborating or negotiating licensing agreements with private companies. This capability allows universities to make decisions as to whether an invention will be marketed before or after a patent application has been filed. In some instances, an invention may be marketed without ever obtaining a patent. The representatives contacted believe that the changes resulting from the law are positive steps toward helping universities transfer technologies to the market place.

We did not request comments on this report from federal agency officials because we did not perform audit work at any federal agencies, and we do not have any adverse comments about any agencies or organizations. We are sending copies of this report to appropriate House and Senate committees. We will also make copies available to interested organizations and individuals, as appropriate, on request.

Sincerely yours,

A handwritten signature in cursive script that reads "J. Dexter Peach". The signature is written in dark ink and is positioned above the printed name and title.

J. Dexter Peach
Director

Objectives, Scope, and Methodology

Our specific objectives were to obtain answers to the following questions.

1. What has been the perceived impact of Public Law 96-517 at universities that are active in patent activities?
2. How many inventions have been disclosed (i.e., discovered and reported to universities' patent administrators) since passage of Public Law 96-517?
3. How have the universities marketed (i.e., licensed) their inventions?

We limited our work to obtaining information on 19 U.S. universities' patent activities during the 3-year period between January 1, 1982, and December 31, 1984. The 19 respondents represent a broad mix of universities. They vary in size, location, type of universities, type of research performed, amounts of federal and nonfederal funds received to support research, and methods used to transfer technologies to the market place. According to the National Science Foundation's fiscal year 1981-84 budget data on universities' research and development (R&D) expenditures, 15 of the 19 universities ranked among the top 20 universities that had the most federally financed R&D expenditures between January 1, 1982, and December 31, 1984. However, our sample of universities is not representative, and our results cannot be generalized to all U.S. universities.

To select the universities, we asked officials at the Departments of Commerce, Energy, and Health and Human Services (HHS); the National Aeronautics and Space Administration; and the National Science Foundation (NSF) and patent management administrators at various universities to give us the names of other universities that they believe are very active in patent-related activities. We also used NSF's fiscal year 1981-84 budget data to assure ourselves of selecting institutions that received a wide range of R&D funding from federal sources.

The universities selected are as follows:

1. Boston University
2. University of California System
3. California Institute of Technology

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4. Cornell University²
 5. Duke University
 6. Harvard University
 7. University of Illinois
 8. Iowa State University of Science and Technology
 9. Johns Hopkins University
 10. Michigan State University
 11. Michigan Technological University
 12. University of Minnesota
 13. University of Pennsylvania
 14. Stanford University
 15. State University of New York
 16. Texas A&M University System
 17. University of Washington (Seattle)
 18. Washington University (St. Louis)
 19. Wisconsin University²

To collect the information, we interviewed patent management administrators (hereafter referred to as university representatives) at the 19 universities; patent officials at the Research Corporation and University Patent, Inc., which are two patent management firms who perform various patent activities for universities; and representatives of the Society

²The Cornell Research Foundation and Wisconsin Alumni Research Foundation handle all patent-related activities for their respective schools. Therefore, we obtained information from foundation representatives instead of university officials.

Appendix I
Objectives, Scope, and Methodology

of University Patent Administrators (SUPA), which is a nonprofit organization representing about 400 patent administrators from various colleges and universities throughout the country. In addition, we obtained 3-year statistical data from the 19 universities' representatives on invention disclosures under federally funded research.

Studies of Universities' Experiences Under Public Law 96-517

Study #1:

Assessment of the Effects of the Uniform Patent Act (Public Law 96-517) Upon Sponsorship of University Research by Private Industry (dated February 12, 1985, and conducted by Abt Associates, Inc., of Massachusetts)

Objective:

To identify effects of Public Law 96-517 upon sponsorship of university research by private industry since July 1981, when the law became effective. This study was conducted at the request of the Director of NSF and the National Science Board.

Scope/Methodology:

Questionnaires were sent to nine major U.S. R&D intensive universities, nine U.S. private companies, and three German firms that have had an active history of patent applications.

The primary focus at the universities were three fields of science—biology, electrical engineering, and material sciences. Questionnaires were sent to one senior patent officer familiar with the patent policies and practices at his university and one scientist-inventor active in each of the three science fields.

Schools included in the study were

- California Institute of Technology,
- Cornell University,
- Johns Hopkins University,
- Massachusetts Institute of Technology,
- Stanford University,
- University of California,
- University of Illinois,
- University of Minnesota, and
- University of Wisconsin.

Findings

1. Inventions developed under federally sponsored research have become more commercial, and universities and private companies are more willing to collaborate since Public Law 96-517 became effective. The law influenced these events by making it easier for industries and universities to collaborate and by simplifying the conditions under which inventions can be patented. Industry no longer fears federal government involvement in the acquisition and licensing of patent rights.

2. Patent applications filed by universities have increased; however, none of the survey participants believe that Public Law 96-517 caused this event.

3. Very few patents produce sizeable royalty income. Total annual royalty income reported by the schools may have been generated by one or more patents.

Study #2:

Survey of Institutional Patent and Copyright Policies and Their Administration (dated August 7, 1985, and conducted by the Society of University Patent Administrators (SUPA))

Objective:

To determine what effects recent changes in federal laws, rules, and regulations concerning ownership and handling of patentable and copyrightable materials have had on colleges, universities, and nonprofit organizations' patent and copyright policies. This study was undertaken as a self-initiated project by SUPA members.

Scope/Methodology:

Members of SUPA's education committee sent a questionnaire, which inquired about institutions' patent and copyright policies and activities between 1974 and 1984, to about 150 institutions in July 1984. The committee received 127 responses; 119 were from colleges, universities, and nonprofit organizations within the United States,³ 6 were from Canada, and 2 were from foreign countries. About 116 of the respondents were SUPA members; the others were not.

Findings (Patent Related):

1. Patent policies at many institutions (50 percent) have been revised, updated, or adopted within the past 5 years.
2. Proper disclosure of inventions is much more of a concern now than it was before passage of Public Law 96-517.
3. Between 1974-84, 84 of the 119 U.S. institutions applied for a total of 4,105 patents. Thirty-five institutions applied for no patents.

³Fourteen of the 119 institutions were included in our study (GAO/RCED-86-93) of universities' patent activities.

4. Of the 4,105 applications filed, patents were issued on 2,944 (71 percent) of them. Over 1,472 (50 percent) of the 2,944 patents went to 8 of the 84 institutions that filed for patents. Eighteen institutions had no patents issued to them.

5. Of the 2,944 patents issued, only 1,058 (36 percent) of them were licensed. In addition, 59 of the 119 institutions reported that they used patent management firms to market their inventions. Fifty-four (91 percent) of the 59 institutions reported that they used the Research Corporation.

6. Institutions generally have their own formula for determining the amount of royalties paid to inventors. These amounts are generally determined on a case-by-case basis.